62. McGinn, S., and White, P. D.: Acute Cor Pulmonale Resulting from Pulmonary Embolism, J.A.M.A., 104:1473-80, 1935.
63. Meade, W. H., and Ochsner, A.: Spool Cotton as Suture Material, J.A.M.A., 113:2230, 1939.
64. Murnaghan, D., McGinn, S., and White, P. D.: Pulmonary Embolism With and Without Acute Cor Pulmonale, With Especial Reference to Electrocardiogram, Am. Heart J., 25:573-97, 1943.
65. Murray, G.: Heparin in Thrombosis and Blood Vessel Surgery, S. G. & O., 72:340-4, 1940.
66. Neumann, R.: Centers of Origin and Focus of Development of Thrombosis of the Leg, Arch. F. Path. Anat., 301:708, 1938.
67. Ochsner, A.: Intravenous Clotting, Surg., 17:240-59 (Feb.), 1945.
68. Ochsner, A., and DeBakey, M.: Rational Therapy of Vascular Thrombosis, New Orleans Medical and Surgical Journal, 94:173-8 (Oct.), 1941.
69. Idem: The Rôle of Vasospasm in Thrombophlebitis and Its Treatment of Novocain Block of the Sympathetics, Tri-State M. J., 13:2654, 1941.
70. Ochsner, A., and DeBakey, M.: Therapeutic Consideration of Thrombophlebitis and Phlebothrombosis, New England J. Med., 225:207, 1941.
71. Idem: Therapy of Phlebothrombosis and Thrombophlebitis, Arch. Surg., 40:268, 1940.
72. Ochsner, A., and DeBakey, M.: Thrombophlebitis and Phlebothrombosis, Southern Surgeon, 8:269, 1939.
73. Idem: Thrombophlebitis, the Rôle of Vasospasm in the Production of the Clinical Manifestations, J.A.M.A., 114:117, 1940.
74. Ochsner, A., and DeBakey, M.: Treatment of Thrombophlebitis by Novocain Block & Sympathetics, Surgery, 5:491 (April), 1939.
75. Ochsner, A., DeBakey, M., and Schroeder, G.: The Significance of Phlebography in Thrombophlebitis and Phlebothrombosis, J.A.M.A., 123:738, 1943.
76. Olow, J.: Acta Obst. et Gynec. Scandinav., 10:159, 1930. Cited by McCartney.
77. Ophuls, W., and Dobson, L., Cited by Rosenthal, S. R.: Thrombosis and Fatal Pulmonary Embolism, Arch. Path., 14:215, 1932.
78. Parsons, R. J., and McMaster, P. D.: The Effect of Pulse Upon the Formation and Flow of Lymph., J. Exper. Med., 68:353 (Sept.), 1938. McMaster, P. D., and Parsons, R. J.: The Effect of the Pulse on the Spread of Substances Through Tissues, Ibid, 68:377 (Sept.), 1937.
79. Pendergrass, E. P., Chamberlain, G. W., Godfrey, E. W., and Burdick, E. D.: A Survey of Deaths and Unfavorable Sequelae Following the Administration of Contrast Media, Am. J. Roentgen and Radium Therapy, 48:741 (Dec.), 1942.
80. Pilcher, R. S.: Slowly Fatal Pulmonary Embolism, Lancet, 2:942, 1938.
81. Potts, W. J., and Smith, S.: Pulmonary Embolism: An Experimental Study of Variations in the Volume Blood Flow in the Inferior Vena Cava of the Dog, Arch. Surg., 42:661-4, 1941.
82. Putnoky, J., and Farkas, K.: Vergleichende Pathologisch Histologische Utersuchung Des Herzmuskels Bei 1009 Obduktionen, Uter Besonderes Beachtung Der Falle Von Thrombosen Und Embolien, Virchows Arch. F. Path. Anat., 287:400, 1932. Cited by Ochsner (67).
83. Putzer, Rita: Die Wadenvenen Thrombose in Ihrer Beziehung Zur Architektur Der Wade, Arch. F. Gynak, 169:444-52, 1939.
84. Robertson, H.: A Clinical Study of Pulmonary Embolism, Am. J. Surg., 41:3-21, 1938.
85. Roessle, R.: On the Significance and Origin of Venous Thrombosis of the Lower Legs, Arch. F. Path. Anat., 300:180, 1937.
86. Sgalitzer, M., and Kollert, V.: Kontrast Austellung Der Venen Im Roentgen Bilde, Klin Wchnschr., 10:1659, 1931.
87. Simpson, K.: Shelter Deaths from Pulmonary Ebolism, Lancet, 2:744, 1940.
88. Smith, L. A., and Allen, E. V.: Vascular Clinics, XIV, Studies on the Rate of Venous Blood Flow; Physiologic Studies and Relation to Postoperative Venous Thrombosis and Pulmonary Embolism, Proc. Staff Meetings, Mayo Clinic, 16:53-7, 1941.
89. Sproul, E. E.: Carcinoma and Venous Thrombosis, The Frequency of Association of Carcinoma in the Body or Tail of the Pancreas with Multiple Venous Thrombosis, Am. J. Cancer, 34:506, 1938.
90. Stick: Annual Session of the German Surgical Society, J.A.M.A., 105:525, 1935.
91. Veal, J. R.: Thrombosis of the Axillary and Subclavian Veins, Am. J. M. Sc., 200:27-9, 1940.
92. Veal, J. K.: J.A.M.A., 121:240, 1943.
93. Veal, J R., and Hussey, H. H.: Surgeey of Deep Venous Thrombosis of the Lower Extremity, Surg., 17:218-31 (Feb.), 1945.
94. Veal, J. R., and McFetridge, E. M.: Primary Thrombosis of the Axillary Vein, Arch. Surg., 31:271-89, 1935.
95. Virchow, R.: Beitr. Z. Exper. Path. U. Phys. H., 2:1, 1846. Cited by McCartney.
96. Von Schrotter: In Nothnagel Handbuck Der Pathologie and Therapie, Vienna, 1901, Alfred Holder, 15-13:533. Cited by Kaplan (48).
97. Welch, C. E., and Faxon, H. H.: Thrombophlebitis and Pulmonary Embolism, J.A.M.A., 117:1502-8, 1941.
98. Wilson, L. B.: Ann. Surg., 56:809, 1912.
99. Zava, L.: Sui Vantaggi Del Levar Precoce Digli Operate. Poleclinico (sez. prat.), 47:865-72, 1940. Cited by Ochsner (67).
100. Zink, Cited by Aschoff, L.: Ueber Thrombose and Embolie, Wien. Klin., Wchnschr., 51:1277, 1938.

X-RAY EXAMINATION OF THE CHEST IN A COUNTY HOSPITAL*

ROUTINE EXAMINATIONS IN A COUNTY HOSPITAL IN CALIFORNIA

HERBERT BAUER, M. D.
H. R. GOLDSMITH, M. A.
San Luis Obispo
AND
ARTHUR BRUCE STEELE, M. D.
Santa Barbara

NO one questions today the importance of the routine x-ray filming of the supposedly healthy chest. In the diagnosis of pulmonary tuberculosis and in other unsuspected non-tuberculous[1] lesions of the chest the film is supreme. What seems amazing now is that existing facilities have not been utilized these past twenty years since x-ray has been recognized as the only diagnostic technique worthy of the name in evaluating pulmonary lesions. Year after year the x-ray facilities of hospitals, private and tax-supported, stood idly by while the anti-tuberculosis campaign ground on slowly, emphasizing other means of approach for the most part. In a recent communication the president of the California State Tuberculosis Association, Dr. Howard W. Bosworth[2] of Los Angeles said in part, "The Public Health people had the right idea—every one must be x-rayed."

Enough time has elapsed to have many evaluations of the tremendous effort by the Selective Service System and the Tuberculosis Control section of the United States Public Health Service. In recent months every journal adds additional information. Millions of films have been taken and the most valuable feature of the effort has been the sharing of the knowledge gained from the films; this information has been returned to the Public Health Department of the home county from which the selectee had come, in case of his rejection. A huge central file pooling this information should be established for use by local Public Health Departments.

WHY HOSPITALS SHOULD MAKE ROUTINE X-RAY CHEST EXAMINATIONS

There are many reasons why every hospital[3] should routinely x-ray every admission to its wards. Some of the benefits accrue directly to the hospital that protects its nursing staff[4] from contact with undiagnosed open cases of tuberculosis which in some hospitals comprise from one to five per cent of all entries. Compared with other contagious diseases, the presence of undiagnosed tuberculosis in patients hospitalized for reasons other than tuberculosis, seems hardly pardonable. One does not need to imply that all of a patient's disabilities "from the cradle to the grave" should be diagnosed at the time of one hospital admission. But it does seem reasonable to ask if a most highly infectious, communicable disease should not be diagnosed in an institution where facilities exist for x-raying at nominal cost. To protect the nurses in attendance and the unsuspecting public from which he or she came, as well as to diagnose a lesion early rather than late, seems wise and economical. Most hospitals

* From the San Luis Obispo Hospital and the Office of the County Physician, San Luis Obispo County.

have routine films on their nurses to protect the patients from pulmonary tuberculosis. Is it fair to ask less in return from the newly hospitalized patient?

Compared with routine blood counts, blood Wassermanns, and urinalyses, for the diagnosis of blood dyscrasias, syphilis, and renal pathology, a single routine P.A. film of the chest has been proven to yield a much higher percentage of evidence of pathology many times over. Then, why not a routine x-ray film in all hospitals?

Each year of sanatorium care per patient at a minimum cost of $1,500.00 per annum, if saved by this method, should buy many films or pay overhead, even if 14x17 films were used as in cases here presented. The San Luis Obispo Tuberculosis Association contributed $1.00 per single chest film, the San Luis Obispo County Hospital budget absorbed the balance of the expense.

STUDIES AT SAN LUIS OBISPO COUNTY HOSPITAL

The following survey attempts to show how a County Hospital can be utilized in tuberculosis case finding. Three different groups are described and the results of x-ray examinations compared.

The first group comprises 409 patients who were treated at the General Hospital during the experimental two-year period. A chest film (14x17) was taken routinely on every patient admitted for the first time as in- or out-patient.

The second group comprises all patients who were seen in the Chest Clinic during the same period. The Clinic was conducted by Dr. Arthur Bruce Steele in collaboration with the Staff of the Health Department. A total of 342 patients were seen.

The third group comprises 2,561 persons who volunteered for chest x-rays (4x5) taken by a mobile unit supplied by the California State Tuberculosis Association. The mobile unit remained in this county for one week during May, 1944, and was stationed in a different community each day.

Thus, the first group shows the incidence of tuberculosis in patients who came to the hospital due to some sickness, usually not connected with their chest; in this group only patients eligible for county service, roughly the lowest socio-economic third, were seen. The second group shows the incidence of tuberculosis in patients who are either known contacts of tuberculous individuals, or who themselves showed symptoms suspicious of chest pathology. The third group, comprising volunteers for the mobile x-ray unit, responded to publicity soliciting coöperation in a mass x-ray survey, appealing to their good citizenship and foresight.

It could be anticipated that the greatest number of cases of active tuberculosis would be found among the chest clinic clientele, somewhat fewer among the county hospital patients, and the smallest number among the "healthy" general population. (See Chart 1.) The following figures are a graphic confirmation of this supposition:

RESULTS

(1) Cases showing no evidence of past exposure to tuberculosis:

This group is represented by only 24 per cent of chest clinic patients, 26 per cent of county patients, and 48 per cent of mobile unit volunteers. In the chest clinic sample only 29 per cent of children under 10 years showed no signs of past exposure to tuberculosis, compared to 54 per cent in the same age group among county patients and 79 per cent of the mobile unit; the ratio of unexposed cases within each decade for each of our three groups is illustrated in Chart 2.

(2) Cases showing evidence of exposure to tuberculosis:

(a) Cases showing evidence of healed primary complex: Chest Clinic 47 per cent, county patients 59 per cent, mobile unit 49 per cent; again taking children up to the age of 10 years as indicators, we find that already 43 per cent of the children in the chest clinic showed healed primary complex, while only 36 per cent of county patients, and 20 per cent of mobile unit children have been so exposed by the time they reach their 10th year.

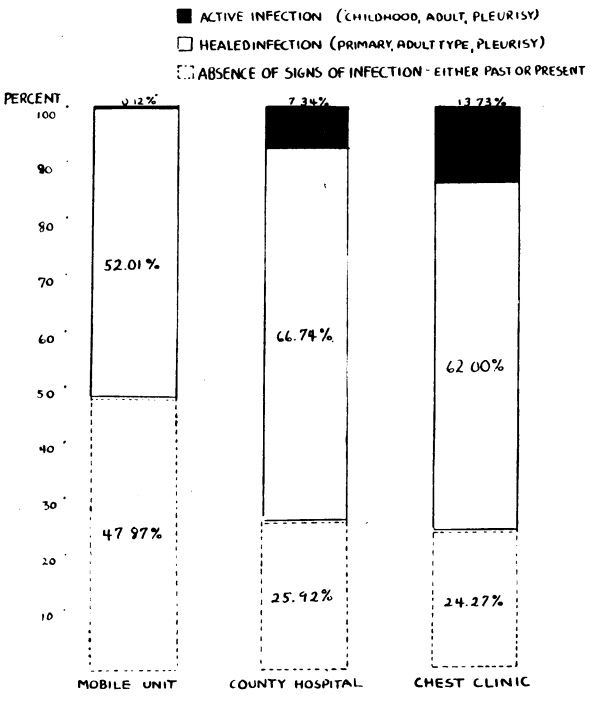

Chart 1.—Comparison of uninfected, healed infected, and active case incidence in three groups.

(b) Active primary complex was found in 4 per cent of chest clinic patients, 1 per cent of county patients, and none among mobile unit volunteers. Practically all these occurred in children under 10, constituting 25 per cent of

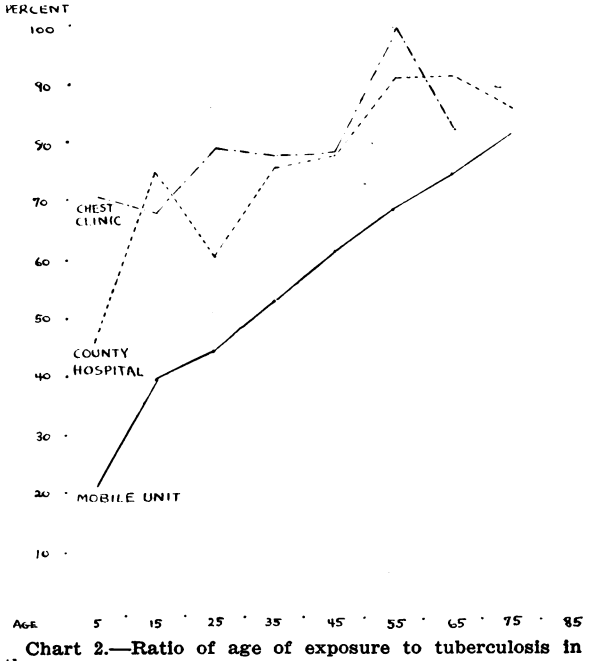

Chart 2.—Ratio of age of exposure to tuberculosis in three groups.

children examined in the chest clinic and 10 per cent of children among county patients.

(c) Healed re-infection type tuberculosis was found in 13 per cent of chest clinic patients, 5 per cent of county patients, and 3 per cent of mobile unit volunteers.

(d) Active re-infection tuberculosis was found in 8 per cent of chest clinic patients, 5 per cent of county patients, and 0.12 per cent of mobile unit volunteers. The overall rate by age is given in Chart 3.

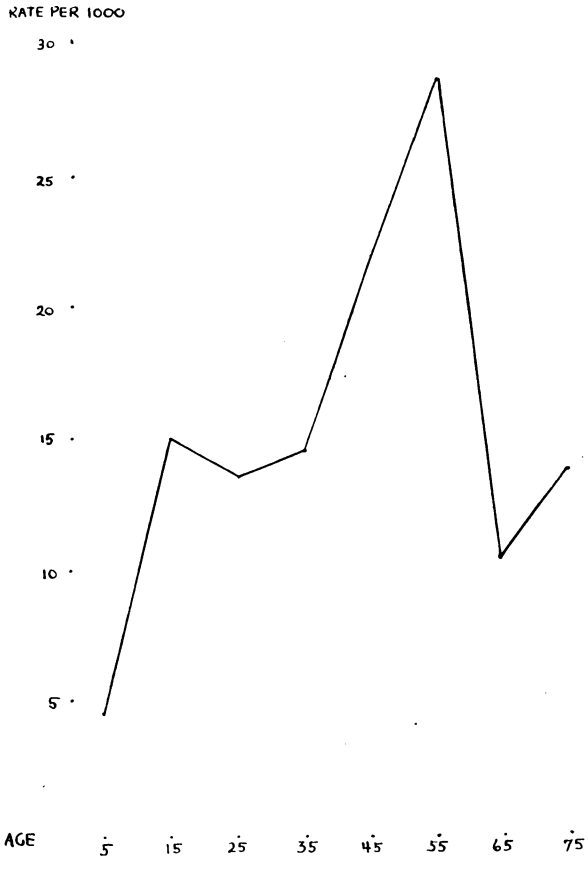

Chart 3.—Overall rate of active tuberculosis according to age.

An additional number of 468 chest films were taken during the experimental period; the group covered comprise all teachers of the county school system, all employees of the General Hospital and Tuberculosis Sanatorium, women attending the Pre-Natal Clinic, and some NYA workers. These groups in addition to the experimental groups discussed previously comprise a total of 3,780 cases. From this total 53 cases of active pulmonary tuberculosis were found. Of these 21 were derived from routine hospital admissions.

Example.—Inclusion of a chest film in every routine examination at a general hospital seems to be worthwhile *only* if this is done in every case regardless of history or clinical status. A man who had been previously hospitalized in various Los Angeles hospitals for a number of non-pulmonary complaints was brought to the San Luis Obispo General Hospital by the police who had picked him up for inebriety and asked that he be kept in custodial care over-night. A routine x-ray film of his chest revealed far-advanced active pulmonary tuberculosis.

SUMMARY

(1) Routine 14x17 x-ray films of the chest were taken at a county hospital in California for a two-year period on all admissions including dispensary from June, 1942, to June, 1944.

(2) The costs were defrayed by the County of San Luis Obispo Tuberculosis Association and the tax-supported county hospital.

(3) The results fully justify the money spent in that many hitherto undiagnosed tuberculosis cases were found, 21 cases from 409 chest films. In addition much non-tuberculosis chest pathology was discovered. (Not reported.) The program will continue until the procedure fails to be economical, i.e., until the cost per discovered case is too high.

(4) In the material surveyed the incidence of pulmonary tuberculosis would appear to be highest among contacts with known cases of open tuberculosis; secondly, among people seeking hospitalization for other reasons, and thirdly the general population.

(5) It would appear that standard films in hospitals on all entering patients is not only good medical practice but good public health.

18 W. Micheltorena Street, Santa Barbara.

REFERENCES

1. Gould, D. M.: J.A.M.A., Vol. 127, No. 13.
2. Newsletter, California Tuberculosis Association, June-July, 1945.
3. Block, R. G.: American Review of Tuberculosis, Vol. 50, No. 5.
4. Barnwell, J. R.: California and Western Medicine, Vol. 59, No. 1.

CLINICAL NOTES AND CASE REPORTS

SJORGREN'S SYNDROME-TREATED WITH STILBESTEROL

REPORT OF CASE

LT. COMDR. BENJAMIN FRIEDMAN (MC), (S), U.S.N.R.
AND
COMMANDER HENRY GERNAND (MC), (S), U.S.N.R.
Los Angeles

SJORGEN'S syndrome is a clinical entity characterized by dryness of the mouth, nasal passages, upper respiratory tract, genital tract, dryness and irritation of the eyes, and arthritis. The eyes present lesions which are included under the heading of keratitis sicca. The disease occurs almost exclusively in women, usually at the time of menopause, and is often aggravated during menstrual disorders. The etiologic basis is presumed to be a deficiency of the female hormones, and this presumption is sustained by a number of cases which have been reported, and successfully treated with the female hormones.

Keratitis sicca, as the name implies, is associated with deficient tear formation, a phenomenon which can be readily ascertained by inserting a narrow strip of filter paper into the lower conjunctival fornix and noting the extent to which the paper has been wetted in a given length of time (Schirmer's test). The cornea usually presents punctate erosions of the epithelium; these stain best with rose Bengal. The bulbar conjunctiva characteristically takes the stain in the form of a rose-colored triangle on either side of the cornea. The corneal epithelium may desquamate in shreds (keratitis filamentosa). These patients are usually first seen by the ophthalmologist because of the ocular distress.

REPORT OF CASE

CASE 1.—Mrs. E. J., age 42, was seen in the eye clinic on December 6, 1944, complaining of burning and pain in